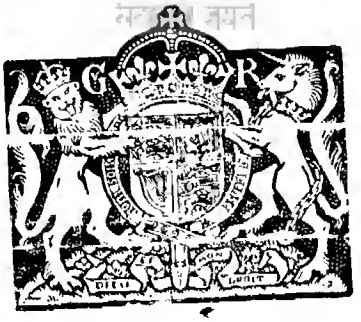
BUREAU OF EDUCATION, INDIA

Pamphlet No. 23

Report of the Technical Education Committee of the Central Advisory Board of Education in India, 1943, together with the decisions of the Board thereon.



Published by the Manager of Publications, Delhi.
Printed by the Manager, Feroz Printing Works, Lahore
1946

Price: *Rs. 1-4-0 or 2s.*

PREFACE

The Board considered the report of the Committee appointed by them to explore the mode of developing the facilities for technical education (including art and commercial education) in the country as a whole. The Board adopted the recommendations of the Committee. In view of the importance of agricultural education in this country with its vast rural population they appointed the following Committee to examine and report on the issue:—

W. H. F. Armstrong, Esquire, C. I. E., M. A., I. E. S.,
Director of Public Instruction, Punjab.

The Hon'ble Pir Illahi Bakhsh Nawazali,
Minister for Education, Sind.

Rao Bahadur Sir V. T. Krishnamachari, K.C.I.E.,
Dewan of Baroda.

Gaganvihari L. Mehta, Esquire, M.A.,
Ex-President, Federation of Indian Chambers of Commerce.

S. N. Moos, Esquire, C.I.E., M.A., I.E.S.,
Director of Public Instruction, Bombay.

John Sargent, Esquire, C.IE., M.A.,
Educational Adviser to the Covernment of India.

Sardar Bahadur Sardar Ujjal Singh, M. A., M.L.A. (Punjab).

The Chairman was authorised to nominate a suitable number of agricultural experts to serve on the Committee.

LIST OF PUBLICATIONS OF THE BUREAU OF EDUCATION IN INDIA

Serial No.	*Name of Publications*	*Year of Publication*
1	Report on Vocational Education in India (Delhi, the Punjab and the United Provinces) (E.H.L.—34).	1937
2*	Report of the Women's education committee on primary education of girls in India—1936.	1937
3*	Report of the Women's education committee of Central Advisory Board of Education to consider curriculum of Girls' Primary Schools in India.	1937
4*	Report of the vernacular education committee of the Central Advisory Board of Education appointed to consider certain questions connected with the administration and control of Primary education.	1937
5	Report of the First committee of Central Advisory Board of Education appointed to consider the Wardha Education Scheme (E.H.L. 40).	1938
6	Report of the 2nd Wardha Education committee of the Central Advisory Board of Education (App. IV to 5th meeting proceedings).	1940
7	Report of the Adult Education Committee of the Central Advisory Board of Education, 1939. (E.H.L. 46) (App. III to 5th Meeting proceedings).	1940
8	Report of the Social Service and Public Administration Committee of the Central Advisory Board of Education in India, 1940 together with the decisions of the Board thereon. (E.C. 6).	1941
9†	Report of the Joint Committee appointed by the Central Advisory Board of Health and Central Advisory Board of Education on the Medical Inspection of School Children.	1941
10	Report of the Scientific Terminology Committee of the Central Advisory Board of Education in India, 1940, together with the decidions of the Board thereon. (E.C. 5)	1941
11	Proceedings of the 6th Meeting of the Central Advisory Board of Education held at Madras on 11th and 12th January, 1941 (E.C. 4 VI).	1942
12	Proceedings of the 7th Meeting of the Central Advisory Board of Education in India held at Hyderabad, Deccan on 14th and 15th January, 1942. (E.C. 4 VII).	1942
13	Report of the School Building Committee. (E.C. 8).	1942
14	Report of the Uniform Braille Code Committee. (E.C. 7).	1942
15	Report of the Examination Committee, 1942. (E.C. 12).	1942
16	Report of the Expert Committee on a Uniform Braille Code for India with the Braille charts printed in India Alphabets 1942.	1941
17	Proceedings of the 8th Meeting of the Central Advisory Board of Education held at Lucknow. (E.C. 4 VIII).	1943
18	Report of the Joint Committee of the Central Advisory Board of Education and the Inter-University Board appointed to investigate the question of the relation of the school leaving certificate Examination to the Matriculation Examination, 1942. (E.C. 9).	1943
19	Report of the Committee of the Central Advisory Board of Education on the Training, Recruitment and Conditions of service of teachers. (E.C. 10).	1943
20	Report of the Committee of the Central Advisory Board of Education appointed to consider the question of the recruitment to the Education Officer, 1942 together with the decisions of the Board thereon. (E.C. 11).	1943
21	Report of the Examination Committee.	1943
22	Proceedings of the 9th and 10th Meetings of the Central Advisory Board of Education in India held in October 1943 and January 1944 respectively. (E.C. 4 IX & X).	1944

Continued on page (ii)

*Not published previously, but proposed to be included in future reprints.
†Published by the Central Advisory Board of Health.

LIST OF PUBLICATIONS OF THE BUREAU OF EDUCATION IN INDIA—*contd.*

Serial No.	*Name of Publications*	*Year of Publication*
23	Report of the Technical Education Committee 1943. (E.C. 16).	
24	Report of the Text Book Committee, 1943. (E.C. 15).	1944
25	Report of the Examination Committee (Technique of Examinations), 1943. (E.C. 17).	1944
26	Report of the Committee of Central Advisory Board of Education appointed to consider the question of Training, Recruitment and condition of service in Universities, etc., together with the decisions of the Board thereon. (E.C. 22).	1945
27	Report of the Central Advisory Board of Education on Post-War Educational Development in India, 1944. (E.C. 13).	1945
28	Volume containing reports of the Committee of Central Advisory Board of Education. (E.C. 14).	1945
29	Report of the Administration Committee of Central Advisory Board of Education.	1945
30	Proceedings of the 11th Meeting of the Central Advisory Board of Education. (E.C. 4 XI)	1945
31	Report of the Agricultural Education Committee of the Central Advisory Board of Education, 1944. (E.C. 20).	1945
32	Proceedings of the 12th Meeting of the Central Advisory Board of Education held at Mysore in January 1946.	1946
33	Report of the Religious Education Committee of the Central Advisory Board of Education.	1946
34	Development of Higher Technical Institutions in India (Interim Report of Sarkar's Committee).	1946
35	Report of the Committee of the Central Advisory Board of Education on selection of pupils for Higher Education.	1946
36	Report of the Central Advisory Board of Education on conditions of service of teachers.	1946

Report of the Technical Education Committee of the Central Advisory Board of Education, 1943.

At their Eighth Meeting held at Lucknow in January 1943 the Central Advisory Board of Education appointed a Committee consisting of the following members, with powers to co-opt, to explore ways and means of developing facilities for technical education in the country as a whole :—

Dr. P. N. Banerjea, M.A., D.Sc. (Lond.), Bar-at-Law, M.L.A.
Mr. Gaganvihari L. Mehta, M.A.
Mr. S. N. Moos, C.I.E., M.A. (Cantab.), I.E.S.
Director of Public Instruction, Bombay.
Mr. John Sargent, C.I.E., M.A.
Educational Adviser to the Government of India.
The Hon'ble Khan Bahadur Sayidur Rahman, M.A., B.L.,
Minister of Education, Assam.
Sir Meverel Statham, C.I.E., M.A., I.E.S.,
Director of Public Instruction, Madras.
Sardar Bahadur Sardar Ujjal Singh, M.A., M.L.A. (Punjab).
Mr. P. F. S. Warren, B.A. (Cantab.), A.M.I.C.E., M.I.E. (Ind.).
Dr. Sir Ziauddin Ahmad, C.I.E., M.A., Ph.D., D.Sc., M.L.A.

2. With the approval of the Chairman of the Board the following members were co-opted on the Committee :—

Mr. R. B. Elwin, I.C.S.,
representing the Industries and Civil Supplies Department of the Government of India
Mr. W. W. Wood, F.R.I.B.A., M.I. Struct. E.,
Principal, Delhi Polytechnic, Delhi.
Dr. W. A. Jenkins, C.I.E., D.Sc., I.E.S.,
Director of Public Instruction, Bengal.

The Labour Department of the Government of India, who were also invited to send a representative, regretted the inability to do so.

3. The Chairman of the Central Advisory Board of Education appointed Mr. John Sargent as Chairman of the Committee.

4. The Committee met at Dehra Dun on the 11th and 12th October 1943. The following members were present:—

Mr. John Sargent (Chairman).
Dr. P. N. Banerjea.
Mr. R. B. Elwin.
Dr. W. A. Jenkins.
Mr. Gaganvihari L. Mehta.
Mr. S. N. Moos.
The Hon'ble Khan Bahadur Sayidur Rahman.
Mr. P. F. S. Warren.
Mr. W. W. Wood.

Dr. D. M. Sen, M.A., Ph.D. (Lond.), Secretary, Central Advisory Board of Education, was Secretary of the Committee.

The following members were unable to attend:—
Sir Meverel Statham.
Sardar Bahadur Sardar Ujjal Singh.
Dr. Sir Ziauddin Ahmad.

5. The agenda and papers circulated to the members of the Committee are set out in Annexures.

6. The Committee had before them, among other documents, the Report on Vocational Education in India by Mr. A. Abbott, formerly H. M. Chief Inspector of Technical Schools, Board of Education, England, who visited India in company with Mr. S. H. Wood in 1936-7. His very valuable survey deals fully with the scope, content and duration of the courses which should be provided in the different types of technical institutions and the Committee regard it as unnecessary to cover the same ground again. They are of opinion, however, that some of Mr. Abbott's conclusions must be reviewed in the light of the Report of the English Board of Education's Consultative Committee on Secondary Education with special reference to Grammar Schools and Technical High Schools (1939), hereinafter referred to as the "Spens Report" and more particularly in the light of the changes which the war has brought about in Indian industrial conditions generally. Special attention should be directed in their opinion to the cultural and vocational value of the new type of secondary schools, called Technical High Schools, envisaged by the Spens Report. The success, which experimental schools of this kind have already achieved in England in ensuring to Industry and Commerce a fair share of the best brains of the country, gives grounds for hope that they may satisfy in India also a need which is already urgent and is likely to become still more so in the post-war period, if present anticipations in regard to industrialisation are realised.

It is impossible to forecast with precision at the moment to what extent the expansion of industry due to the war will be maintained or accelerated after the war or what form or forms it will take. This will largely depend on the plans adopted for post-war reconstruction and development. It is, however, safe to assume that there will be sufficient industrialisation to create an urgent and increasing need for facilities for technical education and that, given an adequate system of practical instruction, there is no reason why India should not be able before long to produce all the skilled artisans, technicians and research workers necessary for her full industrial development.

7. Hitherto the demand has been restricted partly by the limited number of openings which have been available in Industry and Commerce and partly by the practice of filling the more remunerative posts with imported technicians. The supply of suitable students have been adversely affected not only by the uncertainty of subsequent employment but also by the fact that young Indians of the middle and upper classes have not in the past taken readily to industrial occupations. The instruction itself has not escaped the over-academic atmosphere which characterises education generally in India nor has it been linked up closely enough with the actual conditions obtaining in works and factories. What it is fashionable to call a vicious circle has been described by Mr. Abbott in the following words :—

> "No country can initiate and carry on industries on a large scale, unless it has an adequate supply of men specially trained for the direction and management of large industrial concerns as well as of others qualified for the minor but very important supervisory posts in them. On the other hand it cannot be expected that capable and ambitious men will devote themselves to acquiring this special knowledge and skill unless they see a reasonable prospect of exercising it and gaining a decent livelihood thereby"

The experience of the war, however, has already led to a number of salutary changes; it has compelled a large expansion of industry and created a greatly increased demand for technicians of all grades, while at the same time the urgent need for skilled and semi-skilled workers has led to almost

every technical institution in the country becoming a centre for Technical Training Schemes. Many young men, who would not otherwise have embarked on a technical career have been recruited under these schemes and the prejudice against industrial employment has been steadily breaking down. This process is likely to be accelerated when Technical High Schools become an established part of a selective High School system. The ground is, therefore, being rapidly prepared for developments on practical and up-to-date lines but before any attempt is made to forecast the nature and scope of these developments or the precise lines which they should follow, it is necessary to define in relation to the requirements of a modern community the function of technical instruction, including the cognate subjects of education in Commerce and in Art as applied to industrial and commercial needs.

8. Technical education as a branch of education, has a special purpose of its own but it cannot too strongly be emphasised that it is after all an integral part of the general educational system and not merely a special training for industrial employment. "No definition of technical training", observed the Bryce Commission,* "is possible that does not bring it under the head of secondary education, nor can secondary education be so defined as absolutely to exclude from it the idea of technical education".

9. The conception of the function of technical education, as regards both its aim and its content, has been considerably revised and enlarged in Western countries during recent years. Consequently it is important to emphasise from the outset that any scheme for the development of technical instruction as an integral part of a national system must have a two-fold character. It must both form a link between education and industry and it must at the same time receive quite separate consideration as a form of mental training which is especially suited to certain types of intelligence irrespective of their future occupations.

The primary function of technical instruction remains and is likely to remain that of satisfying the needs of industry and commerce for (a) skilled craftsmen, (b) intelligent foremen and executives, and (c) research workers. In Western countries, however, of late years the content of a technical curriculum has been steadily widening, due on the one hand to increased demands on the part of industry, created not only by accentuated competition but also by the emergence of entirely new industries, and on the other hand to a recognition perhaps rather belated, on the part of those responsible that technical education, if it is to be really fertile, should include the study of design and distribution as well as the actual processes of manufacture The industrial product of today to command a market must do its work efficiently, must be attractive to the purchaser and must pass easily and cheaply from the maker to the consumer.

Moreover, the changes which are affecting the character of what is produced are also determining the training of those engaged in production. The ranks of the skilled craftsmen, depleted by the advent of the machine and mass production, are being reinforced by the makers and menders of machines and machine tools. Training in precision work has already acquired an importance out of all proportion to the number of men so employed. New problems, again, both human and material, call for more sympathy, more imagination and a deeper insight into the processess they control from those placed in positions of authority. In his turn the research worker has not merely to concern himself with improvements along established lines; it is also his business now-a-days to explore how a dying industry may be revived or a new one created. It has been assumed, perhaps too readily during the last fifty years even by those who for social reasons deplore their extinction most keenly, that

*Royal Commission on Secondary Education, 1895.

the small business and the cottage industry are bound to be eliminated by the large scale factory. Modern methods of distribution and marketing, however, now give grounds for hope that even in highly industrialised countries the small producer may survive and prosper alongside of his larger rival.

The obvious lesson implicit in these changes is that technical instruction today must be a wider and more liberal form of training than it has been in the past ; it must comprehend the scientific principles underlying the process of manufacture as well as the processes themselves ; it must link up the sciences of production and business organisation with the arts of design and salesmanship. It must take cognisance also of social science in relation to the effect of industrial development on the life of a previously non-industrial community and it cannot even neglect the provision of purely cultural and recreational facilities as an antidote against mental and moral stagnation for those workers who are destined to remain the semi-skilled servants of the machine.

10. At the same time contributing towards the same enlarged conception there is a secondary function of technical instruction the importance of which is being increasingly recognised abroad and has received striking emphasis in the Spens Report. So-called technical subjects have been found to be capable of providing an all-round education or culture as distinct from a vocational training for the many people, not necessarily by any means the less-intelligent, whose mental faculties are more actively stimulated and more fully satisfied by practical than by academic studies. In this sense the technical school or college has a valuable contribution to make towards the introduction of greater variety into education at its higher stages and towards satisfying the need of industry for a reasonablets share of the best brains of the community, which under the influence of the conventional high school seek professional occupations, and too often find unemployment. Further, it may provide many people who were not suited for or were prevented by the economic exigencies of life from taking a university course of the ordinary type, with knowledge of the things necessary to the fuller discharge of their duties as citizens or the more profitable emloyment of their leisure.

11. While the general influences affecting the development of technical education, which have been outlined above, have been felt most strongly hitherto in countries remote from India in distance, in natural resources and in the social and economic conditions under which the great mass of their people live, their practical bearing on the future trend of development in this country can hardly be doubted. If the fillip which the war has given to industrial development is to be maintained and consolidated, it is difficult to think of any country where a real partnership between education and industry is more essential or where it is more important to help the small business or the cottage industry, to increase the supply of skilled craftsmen and competent executives, to convert abundant raw materials to the service of the country which produces them and above all to check the flow of potentially creative intelligence through academic channels in the slough of unemployment.

12. Considered from the point of view of the students, technical instruction will be either pre-employment, or post-employment, that is, it will either be directed to giving young people not yet at work a preliminary training which will prepare them for entry into industrial or commercial occupations or it will afford opportunities to those already in imployment for increasing their skill as craftsmen, for fitting themselves to occupy positions of greater responsibility or for improving their all round equipment as citizens as well as workers.

The size of the area to be served and the extent and nature of its industrial development will determine whether such instruction should be provided in one institution or in several. If in several, then similar considerations will

indicate whether these institutions should each serve one industry or group of industries or whether there should be a central institution at which the more advanced work in all branches should be concentrated, with ancillary schools, conveniently distributed, which will relieve it of the more elementary work and feed it in turn with suitably prepared students. The question of monotechnics *versus* polytechnics has been a controversial issue over a considerable period but the polytechnics wherever practicable and subject to certain exceptions to be mentioned below, has a strong balance of educational, industrial and economic argument in its favour It is indeed hardly necessary to elaborate the case for concentrating provision for technical instruction, and particularly the more advanced branches of it, under one roof. There is in the first place the factor of cost. Technical instruction is necessarily expensive, owing among other reasons to the large amount of practical work involved and the cost of the plant and apparatus required. Secondly, there is the importance of economising teaching power, since competent instructors in many of the more advanced technical subjects are always difficult to obtain. A third argument for centralisation arises from the fact that many technological courses overlap to a certain extent and in a large institution the same workshop or laboratory may be used by students taking different courses. The last but by no means the least important consideration is the benefit students derive from being brought into contact with others engaged in different occupations and studying different subjects.

The monotechnic is to be preferred only where an industry is highly localised, or where its needs are so complicated or peculiar that it is difficult to satisfy them in the same building as those of other industries or where the material to be dealt with, as for instance in tanning, makes it an uncomfortable neighbour.

Accommodation should be provided in the polytechnic, whether it has ancillary institutions or not, for (i) a full-time day school (Technical High School) for boys and in course of time girls also of the normal high school age and type, whose training will be based on the assumption that they may rise ultimately to positions of responsibility, (ii) part-time classes in the day and in the evening both for younger employees (including apprentices) and for older workers, and (iii) classes, full-time or part-time, for more advanced students and (iv) facilities for research workers. Finally there should be provision for adult education of a non-vocational kind.

13. The next step is to apply what has been said above about the general aim and content of technical (including commercial and art) instruction to the post-war conditions of India, so far as it is possible to forecast them. It is clear that the amount, type and location of facilities for technical education will largely be determined by the requirements of industry and commerce, but it is by no means clear at this stage what these requirements are going to be. It is true that war-time production has broken the vicious circle in which industrial development in India has been enclosed in the past. New industries are now being established and the nucleus of a supply of labour for them has been created.

The first task will be to recondition for absorption in civil industry the large number of technicians who have been through an intensive short course of training for war production. It is impossible to say how many of these by the end of the war will have reached the standard of skill and adaptability which will enable them to fit easily in to the post-war system. This applies both to the men enlisted in the technical branches of the Fighting Services and those employed in civil factories. It is, however, satisfactory to know that the Labour Department's Technical Training Centres will be kept going for 18 months after the war in order to complete the training of these workers, where required.

Though it is impossible to say how many technicians will be needed in each main employment category in industry and commerce, it is possible to prescribe the categories themselves and the sort of training their members will require. In the highest category there will be the chief executives as well as the research workers of the future. These will normally have their preliminary training in a Technical High School and will then pass to the Technological Department of a University or to a full-time course of the National Diploma type in a Technical Institution. This category will necessarily be a small one but in view of its importance admission to it should be the outcome of a very strict process of selection.

The next category will contain the minor executives, foremen, charge hands, etc., a not less important class, if only in view of the difficulty which Western countries have experienced in recruiting the right kind of people. It is the main aim of the Technical High School to satisfy this need but the Technical High School pupil on completing the course there will need to continue his technical education either by taking a National Diploma or Certificate Course or by attending part-time classes of a fairly advanced description.

Mr. Abbott has emphasised again and again, and few will disagree with him, the need for concentrating on what may be called the supervisory grade. It is this grade, intermediate between the management and the operatives, "which ought to have sufficient knowledge and intelligence to understand the instructions of the former and sufficient powers of expression to communicate and interpret them to the latter. At the same time they should have sufficient practical skill to earn the respect and confidence of the operatives whose work they direct, control and supervise".

The third category will comprise the skilled craftsmen, most of whom will not aspire to executive positions. These may be recruited from ex-Technical High School pupils but as a rule after passing through the Senior Basic (Middle) Schools, where they will have mastered the rudiments of craft work, they will go on to Junior Technical, Trade or Industrial Schools for a further two or three years' full-time course.

Below these three categories will come the great mass of semi-skilled and unskilled labour. These will not as a rule receive any special technical training before entering employment apart from the craft work they will have done in the Senior Basic (Middle) School. It will, however, be very important to afford them facilities both for continuing their general education and for improving their skill, so that the best of them may ultimately ascend to the skilled class.

It should be made abundantly clear that the rough classification given above does not presuppose a rigidly horizontal organisation of post-war industry. If the necessary incentives are to be provided, promotion must remain open from the bottom to the top and this will be particularly important until the selective system of higher education has been firmly established. Nor must the needs of small businesses or rural industries be forgotten. For the latter separate departments in suitably located Technical Institutions should be provided, where local crafts can be taught and practised under appropriate conditions.

14. While the foregoing refers mainly to technical education, it also covers the general provision to be made for commercial and art students. In regard to commercial education it may be possibe to reduce them to two main groups (a) those who will transact business on an important scale or perform professional functions such as banking, accountancy, etc., (b) those engaged in recording the transactions of group (a). According to Mr. Abbott, group (a) requires mainly a training in imagination, initiative, administration and

leadership, while group (b) needs training in the ordinary office arts, e.g., shorthand, typing, book-keeping, commercial practice, etc., as well as in alertness, accuracy and a sense of responsibility. It is possible that Mr. Abbott somewhat underestimates the need for expert knowledge in those controlling the great processes of salesmanship and distribution. With regard to Art as applied to Industrial and Commercial requirements he gives voice to a well justified criticism when he says "Nothing has disappointed us more than the general neglect of the teaching of Art". Indian manufacturers will be well advised to devote far greater attention to the artistic qualities of the goods they produce. One of the great advantages of a Polytechnic is that it brings those engaged in manufacture into immediate contact with those studying design and distribution.

15. It has already been pointed out that the requisite training for future chief executives and research workers should be provided in some form of senior technical institution and it is desirable to determine the respective parts to be played in this connection by the technological departments of Universities and by Polytechnics and other senior technical institutes, which will not as a rule form part of Universities. The Committee fully realise the very important role which universities should in future play in the progress of technical education in general and in the training of the highest grades of workers in particular. It is often alleged that technical education, as it exists at present, is in its higher stages too academic in character and insufficiently in touch with the actual needs and conditions of industry. There is a good deal of truth in this criticism but the Committee believe that the grounds for it could be removed, if Universities would make their technological courses more practical and ensure that students are given first hand experience of industrial conditions throughout the course and not merely at the end of it. Even if this were done, however, there would still be much to be said for providing the highest forms of training in institutions of the Polytechnic type as well as in Universities. Of the many arguments which can be advanced in favour of this it is not necessary to mention more than two here. Firstly it is most important that the future expert or executive should receive this training in a place where he can come into contact with the people with whom he shall have to deal and work later on; these will not usually be found in a University. Secondly, a technical institution for obvious reasons should be located as close as possible to the industry or industries which it is designed to serve; the location of universities is usually determined by quite different considerations, though some, of course, are in or near industrial areas.

There is also the question of the future control of the highest stages of technical education. If the central body, which it is proposed elsewhere in the report should be set up, is to anticipate and provide for the needs of post-war industry, it should have under its control a comprehensive system of advanced technical instruction in all its branches. It is too much to expect that universities would be prepared to hand over to it forthwith the direction of their technological departments and in any case friendly rivalry within economic bounds may have its advantages during a period of transition and experiment. At a later stage it is possible that senior Technical Institutions, as in some Western countries will become increasingly recognised as the technological departments of Universities.

It is nevertheless necessary that in order to avoid overlapping and wastage there must from the beginning be some co-operation of the work of Technological Departments of universities and that of Senior Technical Institutions. This would be facilitated if there was also a Central Body directing University development, either as a whole or in the fields of technology and applied science.

16. Apart from the recommendations set out above which concern the provision of full-time instruction, it is reasonable to assume that as industrial development takes place, whether in the form of large scale or village industries an increasing number of workers will continue their technical education on a part-time basis by attending classes either in the day or the evening. The drawbacks to evening classes are well-known and owing to climatic and other conditions they may well be greater in India, than in Western countries. Nevertheless, it is fair to record that many people, who today occupy positions of responsibility in Industry all over the world, owe their success to attending at evening classes. Those who give up part of their leisure after a day's work in order to improve their qualifications at any rate show signs of possessing the qualities of grit and determination that make for success in life. Part-time day classes, or the sandwich system, which is an extension of the same idea, on the other hand constitute a factor of great importance in any modern scheme for technical education. Their main advantages may be summarised as follows:—

(1) They minimise fatigue on the part of students.

(2) They bring the efficiency of the instruction under the criticism of students who have some first hand knowledge of the requirements of modern industry.

(3) They enlist the direct interest of employers, inasmuch as they are releasing and, it is to be hoped, paying their employees to undergo instruction during their ordinary working hours and consequently expect to derive some practical benefit from the sacrifice they are making.

In spite of some initial opposition progressive employers in Great Britain have become convinced of the benefits of the part-time day system not only to their employees but also to themselves, and it is now the practice of many firms to release their younger employees to attend technical classes on two half days or one full day a week or even longer at the expense of the firm, which pays not merely the class fees but also the employees' wages during the time spent under instruction. The sandwich system, which is most suitable for the higher grades of workers, means that the employee instead of attending classes for a day or two half days a week, divides the year between the works and attendance at a Technical Institution. The adoption of such a system would be of particular value in India, as it would help to counteract the present over-academic tendency of too many technical courses, whereby a student may spend several years under instruction without obtaining any first-hand experience of actual factory conditions. It is to be hoped that Indian employers will quickly recognise the value of the part-time day system; if not, it may be necessary to stimulate their interest by levying a special tax for the further education of their employees, as was done in France after the last war, on those employers who do not provide the necessary facilities themselves. The cost to them of such part-time instruction is not in any case likely to be prohibitive. Recently an industrialist in England carried out an enquiry in three factories and it was found that the cost of releasing all juvenile employees for a full half-week would amount to only about 2 per cent. of the total wages bill and 1 per cent. of the total cost of production.

17. In addition to the provision of facilities for training skilled artisans and the superior grades, an up-to-date system of Technical Education must also cater for those in the lower grades who wish to improve their equipment as workers and as citizens. The conception of a modern Polytechnic as a People's University has already been referred to and this idea is capable of very wide development in all thickly populated districts.

At this stage the sphere of Technical Education will overlap that of Adult Education, which will also be engaged in the provision of vocational classes

Some demarcation will arise from the fact that Technical Institutions, apart from Agricultural Institutions, which should really be regarded as a part of Technical Education, will normally be found only in urban or thickly populated districts, whereas Adult Education should cover the whole country. At the same time, as the Board's Adult Education Committee has pointed out, it is neither possible nor desirable, especially in India, to draw too strict a line between the spheres of Technical and Adult Education. It will be the business of the responsible Administrative Authority to prevent unnecessary overlapping.

It is quite impossible to forecast the extent of the demand for part-time classes; the provision of such facilities in other countries has proved so remunerative in the widest sense that it is justifiable to lay down the general rule that where any reasonable demand arises, every effort should be made to satisfy it.

18. In view of the extent and nature of the technical instruction and training required for workers of different categories, from the managerial to he operative class, the following courses should be provided:

(i) A two-year full-time course in Trade (or Junior Technical or Industrial) Schools for those who are likely to enter industry immediately afterwards and to become skilled artisans. Pupils will be admitted to this course on leaving the Senior Basic (Middle) School at the age of about 14.

(ii) A six-year full-time course in Technical High Schools for those who aim at reaching ultimately the supervisory or managerial grades or becoming research workers. Only selected pupils will be admitted to Technical High Schools on completing the Junior Basic (Primary) stage at the age of about eleven, though facilities will be provided for transfer up to the age of fourteen from Senior Basic Schools or High Schools of the academic type. The first three years of the course will be devoted mainly to general or cultural subjects.

(iii) A three-year full-time Diploma course, to which students will be admitted after passing the final examination of a Technical High School or an equivalent examination.

(iv) A two-year full-time Advanced Diploma course in Senior Technical Institutions, for those who have obtained the first Diploma.

(v) A three-year part-time Certificate course for those already in employment. Here again the normal condition for entry will be a Technical High School Leaving Certificate or its equivalent.

(vi) A two year part-time Advanced Certificate course for those who have obtained the first Certificate.

(vii) Courses of all kinds and all standards in individual arts, crafts and other subjects related to industry and commerce, for which there may be a sufficient demand.

19. While it is necessary that in Technical as in other branches of education there should be examinations of some kind, since prospective employers will require some certificate as to the standard to which the would-be employee has attained, it is particularly important that in an activity so closely related to constantly changing needs freedom to experiment as well as to modify both methods of teaching and the contents of courses should be at all costs preserved. It is not less important, particularly in the case of those senior students who will receive this training in Polytechnics rather than Universities, that the Diplomas and Certificates awarded to them on the successful completion of their courses should enjoy all-India recognition and should represent an approximately uniform standard. In the absence of any national institutions or recognised examining bodies capable of satisfying this need (the Committee particularly welcome the recent formation of the Association of Principals

of Technical Institutions (India). This Association has already done valuable work in the way of establishing national diploma and certificate courses etc., in the main branches of technical and commercial education and of framing syllabuses in connection therewith, and the Committee are of opinion that all the bodies responsible for administering technical education should not merely recognise this body and give it all the assistance in their power but should also look to it increasingly for help and guidance in all matters affecting the future development of technical instruction generally and the conduct of examinations in particular.

20. As in other branches of education, or perhaps even to a greater extent because it is still more or less a new field, the success of any system of technical education will call for the most careful selection of teachers. It is necessary in the case of all teachers that, apart from possessing the required pedagogic ability, they should be in sufficiently intimate contact with the current problems and realities of the world around them to be able to give their methods of teaching a practical character, to humanise instruction and to stimulate and train the emotional as well as the mental faculties of their pupils. The need for such a realistic and intelligent handling of the human material in their charge is even greater in the case of teachers in technical institutions. Such teachers will be of two main types, those for general or cultural subjects and those for technical subjects. The technical subject teacher must be recruited direct from industry, so that he may be fully conversant not only with the principles underlying the processes of production but also with the practical application of those principles as well as with the actual conditions and problems of industry as a whole. For the general subject teacher it is not, of course, so important that he should have the same first-hand knowledge of industry, but some trade experience is certainly desirable, in order that he may understand both the outlook and methods of industry, and the conditions under which his students have or will have to work and live.

While it is desirable that the teacher of general subjects should have had the normal professional training as well as industrial experience, in the case of teachers of technical subjects such pedagogical training as they may need should normally be provided in the technical institution itself. In the early stages, in view of the dearth of qualified teachers, special arrangements will probably be necessary to give teachers of general subjects some experience of industry and commerce as well as to recruit skilled craftsmen into the teaching profession. Until, however, industrial development has proceeded sufficiently far in this country, it will also be necessary to recruit a large number of technical teachers, at least in the higher grades, from among those who have received their training abroad, or alternatively to send suitable Indian teachers abroad for training. For teachers concerned with the more highly specialised or complicated branches of industry dependence on foreign recruitment may remain for some time, though every effort should be made to provide the requisite training facilities in this country.

21. With regard to conditions of service, the Committee feel that there should be no undue differentiation between the teachers of general subjects and those of technical subjects. They should be regarded as enjoying equal status as members of the teaching staff of the institution though the qualifications of the two categories may vary widely. It is possible, for instance, that a teacher of a technical subject may have no paper qualification at all, but if he possesses the requisite ability and suitability he should not only not be considered in any way inferior to the other teachers but should also have an equal chance of promotion.

Theoretically perhaps the salaries of all teachers in the same grade should be the same irrespective of the subject they teach. In practice, however, such

uniformity cannot be enforced and the principle of higher remuneration for specialist teachers must be accepted for two main reasons. They will normally be recruited from industry and trade where they will have already spent several years acquiring practical experience and thus will enter a technical institution at a higher age than the general subject teachers. Secondly, since they will be drawn from industry and commerce, where the standard of remuneration for experts is higher than anything which the teaching profession normally offers, they must be afforded the necessary inducement to transfer.

The Committee, therefore, recommend the following scales of salaries which, it may be noted, are based on pre-war standards:

(a) Teachers of general subjects in Technical High Schools should receive the same grades of pay as teachers with comparable qualifications in ordinary High Schools. They may, however, be granted up to five increments for appropriate industrial or commercial experience after the age of 20.

(b) Teachers of technical subjects:

(i) Workshop or laboratory Assistants—Rs. 50—1—75. The initial salary should be fixed according to experience.

(ii) Teachers Class III—Rs. 75 - 5—150.

(iii) Teachers Class II - Rs. 175—10—325.

(iv) Teachers Class I—Rs. 400—25 - 1,000 (including Heads of Departments).

(v) Principals—Salary according to the nature and size of the institution.

Teachers in Technical Institutions below the grade of Heads of Departments may be given an allowance of up to 50 per cent. of their salary to meet the higher cost of living in certain areas or other special circumstances.

There should also be a limited number of posts of special responsibility carrying an allowance of Rs. 25 p. m. These posts will normally be confined to Teachers in Class II and Class III.

22. It is necessary not only that technical teachers should possess some trade experience at the time of their appointment but also that they should retain contact with the trades which they are called upon to teach, so that they may keep their own knowledge and methods up-to-date and at the same time remain familiar with the conditions in which their students will have to work. The head of a technical institution should also maintain constant and intimate contact with industry, not merely because he is more than anyone else responsible for ensuring the realistic character of the instruction given in his institution but also because such contact alone can enable him to relate the output of his institution to the changing needs of the occupations it is designed to serve.

In order to encourage teachers to keep up-to-date in their own particular crafts permission should be given to them to undertake consulting practice or commission subject to specified conditions, which will ensure that such private work does not interfere with the efficient discharge of their duties as teachers.

23. In order that the right type of students may be encouraged to undergo technical instruction, which is necessarily more expensive than most other forms of education, care must be taken to see that those with the requisite aptitude are not debarred through inability to pay the prescribed fees.

Those taking part-time courses may perhaps be expected to pay a reasonable fee since they will usually be in employment. Of those selected for full-

time courses, some may be able to pay fees but many are not likely to be in a position to do so. It will, therefore, be necessary to offer a liberal number of freeships, scholarships and maintenance allowances. The number and amount of these will vary in different places but it is reasonable to assume that at least half the students in technical institutions will need assistance in one form or another.

While technical institutions will be provided only in those areas where there is need for them, admission must obviously not be restricted to students belonging to those areas but must be open to every part of the country. It will therefore also be necessary to provide ample hostel accommodation in a large number of institutions where such accommodation is likely to be required.

24. In view of what has already been said in regard to the need for relating technical instruction to the actual conditions and requirements of industries, it follows that technical institutions should be located as close as possible to the industries which they are designed to serve. On the one hand, the teachers and students of technical institutions must be able to study industrial organisation and developments at first hand; on the other, it is equally important that there should be opportunities for constant contact between the employers and the institutions which train their future employees and that technical institutions should be able to obtain readily the advice and criticism of industrial experts.

The need for locating technical institutions near industries necessarily means that certain areas will have abundant facilities for technical education while others will have few or none. If technical instruction, at any rate in the higher grades, continues to be a provincial responsibility, this will mean that while some areas will have to maintain and support a very large number of technical institutions, others will have an unduly light burden to bear. In view of past experience, there is also a considerable danger of opportunities for technical education being denied even to most suitable students who happen to belong to a non-industrial area. It is a common complaint today that admission to institutions providing professional or technological courses of an expensive kind is more or less restricted to residents of the province in which those institutions are situated. Apart from this, however, it may not be fair to expect some areas and not others to meet the whole cost of developments which are really for the benefit of the country generally.

The Committee are, therefore, strongly of opinion that technical education in its higher stages must be organised on on all-India basis. It is not proposed that technical institutions of all types should be brought into an all-India system. Technical High Schools and Trade (or Junior Technical or Industrial) Schools, which will properly be a part of the general system of Secondary Education and which will to some extent cater for local needs, should remain under Provincial Governments. All higher technical education, however, except that in the Technological Departments of universities, should form part of an all-India organisation designed to serve the needs of the country as a whole.

If the Committee's recommendation is accepted by the authorities concerned, it will follow that the entire financial responsibility for such a system should be accepted by the Central Government. This will ensure a coherent and consistent policy in regard to developments in technical education and will also remove the injustices referred to earlier ; it will throw open the doors of every senior technical institution to all suitable candidates, whatever their domicile, and it will relieve the provincial exchequers of an unfair burden.

25. " In nearly every great industrial country " Mr. Abbott pointed in his Report, "technical education and general education are administered by the same Department of State, i.e., the Ministry of Education". In India,

however, there has been no uniformity of practice in this respect and it is the exception rather than the rule to find technical education under the administrative control of the Education Department. The reason for this has probably been that the primary function of technical institutions has been considered to be the serving of particular trade needs, and it was, therefore, thought proper to entrust their administration to the Departments immediately concerned with industry and commerce. There is now-a-days, however, a growing realisation of the value of technical instruction as a means of general education, and it is coming to be recognised that although technical education is a preparation for certain vocations, its primary function is educative ; in other words, it is an integral part of the general educational system. The Committee have, therefore, no doubt that the administration of technical education should be entrusted to the educational authorities.

They feel, however, that since technical education is a highly specialised branch of education, its administration requires expert knowledge and practical experience, and they, therefore, recommend that every Education Department should have a special section dealing with technical education and that there should be a separate directional and inspectorial staff for this purpose.

Although technical education should be administered by the Education Department, there should be very close contact and co-operation between that Department and the other Departments concerned as well as with industry and commerce. While the need for such co-operation can hardly be overstressed, the Committee do not wish to lay down any rigid rules or exact procedure for ensuring it. It must obviously be based on a realisation of community of interest, and there is ample room for experiment in devising the best means of bringing together the many interests concerned.

26. The need for organising higher technical education on an all-India basis has already been emphasised. In view of probable post-war industrial development the nature of such an organisation will call for careful consideration. At present there is no machinery which can effectively stimulate and supervise a large development of technical education. The formation of the Association of Principals of Technical Institutions (India) has already been welcomed as an important step in the direction of co-ordinating technical instruction on an All-India basis, and the Committee feel that it should be given every encouragement in its work ; but while this body can render very useful service in advising as to the lines which development should follow and particularly in undertaking the essential preliminary surveys, it is hardly suited to shoulder administrative responsibilities and the need for a controlling authority remains.

To ensure both comprehensive planning and the fullest co-operation and contact between the different Government Departments concerned and industry and commerce, the Committee are of opinion that there should be an All-India body in supreme charge of all higher technical education, except that provided in the Technological Departments of universities. This body should consist of representatives of all the Government Departments concerned, Central and Provincial, of Industry and Commerce, associations of employers or of employees and of other interested bodies such as the Central Advisory Board of Education, the Universities and the Association of Principals of Technical Institutions (India). Effective liaison with universities will be essential.

This central body, which might be called the All-India Council for Technical Education, should concern itself not so much with the day-to-day administration of individual institutions, which should have their own governing bodies as with prescribing policy generally, and allocating government grants in such a way as to ensure that it can be carried out.

27. The following is a summary of the Committee's main conclusions and recommendations:—

(1) In view of the recent expansion of industry and the likelihood of further development after the war it is necessary to plan immediately a comprehensive system of technical education at all stages.

(2) The function of Technical education may be described as two-fold, (a) to meet the needs of industry and commerce for properly trained workers of all grades and (b) to provide a suitable form of education for those boys and girls whose natural abilities can best be developed by instruction on practical lines.

(3) Technical education should be regarded as an integral part of any educational system and as in no way inferior to education of the academic type.

(4) Education from the earliest stages should be given a more practical character, and the curriculum should aim at making boys and girls familiar with practical as well as academic subjects.

(5) Technical education must include commercial education and art in relation to industry.

(6) Agricultural education should be regarded as an essential branch of technical education and should be closely linked up with the other branches. Senior Basic or Middle as well as High Schools in rural areas should have an agricultural bias.

(7) In view of the great importance of agricultural education for this country a special committee of educational and agricultural experts should be set up to consider the subject fully.

(8) In order to provide suitable instruction and training for the different types of workers required there should be the following main types of technical institutions :—

(a) Junior Technical or Industrial or Trade Schools,
(b) Technical High Schools,
(c) Senior Technical Institutions.

(a) and (b) will normally provide full-time instruction preparatory to employment, while (c) will also provide part-time instruction for those already in employment.

(9) The type and duration of part-time instruction should be determined in consultaion with employers and according to the needs of the locality. It is desirable that part-time classes should be held during the day rather than in the evening.

(10) Wherever circumstances permit polytechnics are to be preferred to monotechnics.

(11) The following courses of studies should be provided in technical institutions :—

(i) a two-year full-time course in Junior Technical or Industrial or Trade Schools to which pupils should be admitted on leaving the Senior Basic (or Middle) schools at the age of about fourteen,

(ii) a six-year full time course in Technical High Schools to which selected pupils will be admitted on completing the Primary (Junior Basic) stage at about the age of eleven. The first three years of the course will be mainly devoted to general subjects,

(iii) a three-year full-time Diploma course to which students will be admitted after passing the final examination of a Technical High School or an equivalent examination.

(iv) a two-year full-time Advanced Diploma course for those who

have passed the above examination,

(v) a three-year part-time Certificate course in Technical High Schools for students already in employment,

(vi) a two-year part-time Advanced Certificate course for those who have passed the above examination, and

(vii) classes in individual arts, crafts and other subjects, related to Industry and Commerce for which there may be a sufficient demand.

(12) There should be only one external examination at the end of a course. Other examinations should be conducted internally.

(13) All teachers in technical institutions should have some first-hand experience of some branch of industry or commerce.

(14) (a) Teachers of general subjects in Technical High Schools should receive the same grades of pay as teachers in ordinary High Schools. They may be granted up to five increments for appropriate industrial or commercial experience after the age of twenty,

(b) Teachers of technical subjects should receive the following scales of salaries:—

(i) Workshop or Laboratory Assistants—Rs. 50—1—75. The initial salary should be fixed according to experience.

(ii) Teachers Class III—Rs. 75—5—150.

(iii) Teachers Class II—Rs. 175—10—325.

(iv) Teachers Class I—Rs. 400—25—1,000.

(v) Principals—Salary according to the nature and size of the institution.

Teachers in Classes II and III may in certain areas be given an allowance of up to 50 per cent. to meet the high cost of living or other special circumstances. There should also be a limited number of posts of special responsibility carrying an allowance of Rs. 25 p.m. These will normally be limited to Teachers in Class II and Class III.

(15) All teachers of technical subjects should be encouraged to keep in touch with the appropriate branch of industry or commerce and, with this object in view, they should be permitted to undertake consulting practice or commissions, subject to approved conditions designed to prevent such private work interfering with the efficient discharge of their duties as teachers.

(16) There should be an adequate system of scholarships and maintenance allowances designed to ensure that no one having the necessary aptitude and ability should be prevented by lack of means from pursuing a course in technical institutions. Hostels should be provided wherever necessary.

(17) Technical institutions should be located in or near industrial and commercial areas, but students from other areas should have an equal opportunity of admission to those institutions. To ensure this it is necessary that technical education should be organised on an all-India basis.

(18) Technical High Schools and Junior Technical, Trade or Industrial Schools should be administered by Provincial Governments, but all technical education beyond this stage, except that conducted in the Technological Departments of Universities, should be placed under a central controlling body which would have on it representatives of all the interests concerned. This body should be set up as soon as possible.

(19) The formation of A. P. T. I. (I) is a most welcome step in the direction of co-ordinating technical instruction in the country. It should be given adequate representation on the central controlling body.

(20) It is essential that the administration of all technical education should be under the Education Department of the Central or Provincial Government or State, as the case may be. There should be a separate inspectorial staff for this purpose. The Education Department should maintain close contact with the other Departments concerned with Industry and Commerce.

(21) As a corollary to technical education in its higher stages being administered by a central body, the financial responsibility will have to be accepted by the Central Government.

ANNEXURE I

Agenda

1. To consider the scope and function of Technical Education in the light of recent developments and with special reference to the future needs of India, so far as these can be foreseen.

2. To consider whether the following branches of instruction should be regarded as coming under the general heading of Technical Education:—

(a) Commercial Education.

(b) Art in relation to Industry.

(c) Agricultural.

3. To consider what types of institution should be included in a national system of Technical Education and in this connection to define the special function and place of Technical High Schools and Junior Technical or Industrial Schools in relation to the other branches of the Educational System.

4. To consider the proper relationship of the higher branches of technical instruction, including research, to universities and institutions of university rank.

5. To determine how far the provision for Technical Education should consist of full-time courses preparatory to employment or of part-time courses, day or evening, designed for those already in employment.

6. To consider the content and duration of the main types of course to be provided in technical institutions.

7. To consider the question of Examinations at the different stages of Technical Education.

8. To consider the question of the recruitment, training, and condition of service of teachers for technical institutions of different types.

9. To consider what arrangements should be made for enabling suitable students in poor circumstances to take full advantage of facilities for technical education.

10. To explore the best means of organising and administering Technical Education in order to meet the needs of the country as a whole.

11. To consider what Department of Government should be generally in control of Technical Education.

12. To consider what steps should be taken to secure the active co-operation of other Departments concerned with technical problems as well as of employers and employees in Industry and Commerce.

ANNEXURE II

Note on Technical High School

General aims.—The general aims of a Technical High School will be to offer to pupils of the normal high school type an alternative form of higher education of a less academic character, which will allow a greater freedom of choice both to pupils and teachers and will comprise in the later stages grouped courses incorporating the principles of technology and of commerce. Technical skill and manual dexterity will not be pursued merely for their own sake. The object will be to cultivate an interest in the wider problems of modern industry rather than in the technical difficultties of particular processes, so that the pupil upon entering employment will bring to bear an interest in his trade or profession not confined only to the office or workshop but embracing its more comprehensive aspects, whether economic, technical or sociological.

Age of admission and length of course.—In order to secure the right type of pupil it will be important to fix the age of admission not higher than that at which boys commonly enter upon other forms of post-primary education, i.e., about 11 *plus*. For the first three years (or possibly four if boys are admitted in any number before 11) the curriculum should be of a general character and on similar lines to those followed in a good middle school so that at the end of this stage pupils, whose particular bent or probable future occupation would best be met by a normal high school course, may be transferred without difficulty. This would at the same time facilitate transfers from as well as to high schools. After this stage a certain number of subjects of a practical character will be introduced into the curriculum but it should again be emphasised that the methods by which they will be approached will be primarily cultural and that the general education of the pupils in such subjects as the Mother Tongue, English, History, Geography and Mathematics will be correlated with but not subordinated to the practical instruction. As the number of grouped courses containing technical, commercial and art subjects will depend on the number of pupils admitted, their particular desires and aptitudes, as well as the needs of industry and commerce in the area which the school may be expected to serve, it will be undesirable to specify in too great a detail what these grouped courses will comprise, at any rate during the experimental stage. In any case this will be a matter for determination in the first instance by the principal in consultation with his Heads of Departments. As a general indication, however, it may be taken that the properties of materials, the elements of engineering science, measured drawing and simple design will find a place in the technical course, while commercial geography, economic history and business practice will form part of the commercial course. This second stage would normally last for three years, the practical subjects occupying a progressively large place during the last two years.

A very important question will arise in connection with the medium of instruction. As it is hoped that pupils leaving the school will ultimately attain to positions of responsibility in the business world, it is important that by the time they leave they should have a sound practical mastery of English, i.e., they should be able to read, speak and understand English as used by an educated Englishman. English of this kind as distinct from the English of poets and classical writers should occupy a prominent place from the beginning of the course, but the stage at which and the subjects in which it should be used as the medium of instruction may be left for decision in the light of experience. Shorthand and typewriting, if the demand for them is sufficiently great, should be taught intensively towards the end of the course. It is realised that suitable text-books for some of the proposed subjects may not be available in Bengal. In such cases the school must satisfy its own needs by writing them or getting them written.

A further question is whether schools of this type should take on external leaving examination. There can be little doubt that pupils, parents and prospective employers will all look for some certificate that the course has been successfully completed, but external examinations must on no account be allowed to dominate the curriculum or restrict freedom to experiment.

It is essential that all pupils throughout should be provided with the same social and recreational amenities as they would enjoy at a good high school and emphasis should also be laid on the fact that the school aims at turning out adaptable well-educated boys rather than trained specialists for any particular branch of industry and commerce. If this objective is kept clearly in mind the intake of the school need not be determined by any statistical survey of the capacity of local industry to absorb leavers in as much as the normal leaver will be at least as adequately equipped as the high school leaver to find employment.

Placing of leavers in employment.—If schools of the type contemplated are to be regarded as addition to the provisions for higher education already made in schools of the accepted high school type, their products must increase the number of juveniles seeking employment of a progressive and attractive kind. If, however, their main object is to provide instruction which will lead to more suitable employment for young people who would remain in any case at some kind of school until 17 or 18, the numerical aspect of the effect of their output on the labour market becomes less important. The general question, however, of suitable employment for boys (and girls) leaving school, and particularly for those who have been kept there at some sacrifice by their parents with the hope of their making a better start in life, requires careful study. It is a valid criticism of the present educational system that it produces an article and does not concern itself whether the finished product finds a market and if it finds one, whether it fetches what it is worth. From this point of view also it is essential that the new type of school, because it is new, should enlist the active interest and support of industry and commerce from the beginning and that what it stands for and what it offers should be made known at every opportunity to the public at large. A Careers Bureau will form a necessary part of the organisation. Steps should also be taken to ascertain not only from the principal employers of labour in the area but also from Government Departments which might find suitable recruits in the type of body produced by a school of this kind and from municipal undertakings with similar needs the approximate number of leavers they would be prepared to take on annually.

Possible modification in the organisation of the Technical High School during the transitional stage.—It will be observed that the suggested course for the Technical High School is designed to cover six years beginning from the age of eleven plus. This means that the normal boy will complete the course at about the age of seventeen. I am aware that at the present time, not only in Bengal but also in India generally, boys are accustomed to complete their high school course and even to enter universities at a much younger age. I believe, however, that modern educational opinion in India is coming to regard the truncation of the high school course and the unduly early commencement of the university course as undesirable and that before very long it will be the exception rather that the rule for a boy to start a university career before the age of seventeen. I feel, therefore, that the length of the course suggested for the Technical High School should stand, though during the period of transition it may be necessary to shorten the second stage of the course, at any rate for the abler boys, from three years to two. This may involve a certain amount of adjustment in the curriculum at the earlier stage, though it is to be hoped that the need for this will only be temporary.

This note was written sometime ago. Mr. Wood, Principal of the Delhi

Polytechnic, who has practical experience of running a Technical High School in India, will be able to advise the Committee how far in his opinion the views expressed in the note require modification.

Sd/- JOHN SARGENT.

ANNEXURE III

Note on the History of the Control of Technical and Industrial Education in India

The Report of the Indian Industrial Commission (1916—1918) contained the following observations on the question whether the control of Technical and Industrial Education should be exercised by the Departments of Education or the Departments of Industries :—

"177. Although we have proposed to place the control of technical and industrial education under the Departments of Industries, we are aware that, specially in regard to the former class of education, there is a strong body of opinion in favour of retaining it under the Director of Public Instruction.

"This opinion appears to be based on the following grounds; firstly, that the Department of Education cannot be dissociated from these forms of teaching without loss, on account of the importance of method, with which that department is naturally more familiar than any other; secondly, that any form of teaching which is removed from the Department of Education may lose prestige in the popular mind ; thirdly, that all technical and industrial training must include some degree of general education, with which the Department of Education is organised to deal.

"178. In meeting these arguments, it must be borne in mind that, in the first place, education designed to produce men who will readily find industrial employment must in any case be very largely controlled by an agency which, by its training and constant association, is in touch with the industries that will furnish that employment. Both in devising educational schemes and in ensuring by inspection that they are actually followed in working, this class of agency must have a predominant part. It is not enough to appoint a man with an industrial training as an inspector of Industrial school; he must throughout be kept in touch with industries and industrialists, or the training given will soon degenerate. Speaking generally, the different forms of technical and industrial education have as their object either the training of a man who will ultimately direct industrial operations or the productions of workman skilled in some form of handicraft. Of the success of the teaching, the private industrial employer must remain the ultimate judge. The Department of Industries is the only Government organisation capable of entering into his point of view, and the only one with which he can readily associate himself. It is the only agency of any kind that can correlate the training of the requirements as ascertained by it. Almost every educationalist of standing who appeared before us was in general agreement with these views.

"Our conclusions are strengthened by a consideration of the nature of the various forms of technical and industrial education, the necessity of which has been indicated in our report. In the case of industrial schools, where craftsmanship is the all-essential feature of the training, the small amount of elementary general education that is required can easily be supervised by any person of ordinary intelligence, whilst the teaching of craftsmanship must be provided and controlled by an agency which knows from practical experience the type of employee required by an industry, and can judge if the requirements have been fulfilled. This the Education Department is not likely to be able to do, judging by the results of its past efforts in this direction. In the case of artisans who are trained in shops, the same arguments apply; and it

will be easier for a Department of Industries to maintain the necessary relations with railway or private shop managements. The superior training for foremen which will be given under somewhat similar conditions but to better educated persons and will involve a greater amount of theoretical teaching seems to fall into the same category ; the only question is whether the theoretical teaching requires any degree of control by experts in the methods of imparting teaching generally. The danger of allowing the theoretical to outweigh the practical aspect of the training must be remembered. It must also not be forgotten that the experience of industrial and technical training in other countries has evolved its own theories, traditions and expert teachers, of which the Department of Industries can make a more understanding use than the Department of Education. The control of the foregoing forms of education should, therefore, rest with the Department of Industries, but the advice and co-operation of the Department of Education should be obtained in respect of general educational subjects, both in framing the courses of instruction and in deciding on the methods of teaching and inspection.

"It is only where some form of higher theoretical instruction is needed, such as that proposed by us for engineers and specialised technologists, that any question arises of the participation of the Department of Education in the control. Part of the education of engineers and the entire training of men for posts of specialised technologists should, we have suggested, be given in institutions of collegiate rank. Their expenditure should be administered and their teaching controlled by joint boards, on which the Department of Industries, the local University and employers should be represented. We have already explained the relations which should exist between the Universities and these colleges.

"179. We desire here to draw attention to the great diversity of practice which has hitherto prevailed in the methods of imparting industrial and technical education of all kinds in different parts of India, a diversity which has unfortunately permitted the existence of much inefficient or misdirected teaching. We think it necessary, for some time at any rate, to arrange for the provision of a system of regular visits by specialist officers of the Imperial Department of Industries. There is at present in the various provinces no generally accepted tradition of correct methods in these forms of teaching, and we think that Local Governments and Departments of Industries would be greatly assisted in their efforts to create one, by occasional visits from imperial officers, whose functions would be merely advisory, and would be confined to placing their notes and observations before the Local Governments for consideration. The specialist visitors would form a convenient channel for transmission to one province of useful experience acquired by another, and this would enable Local Governments, while retaining complete control of their own industrial and technical education, to profit by the knowledge gained elsewhere".

The recommendations of the Industrial Commission were generally followed in all Provinces in India, except Bombay. In Bombay an industrial workshop was placed under the Industries Department for some time and that Department also supervised the weaving schools, but the Department of Education (assisted by a Committee of Direction) remained in control of technical and industrial education. The majority of a Committee which considered the subject of technical education in Bombay in 1921-22 recorded their opinion that " in common with most other provinces, the provincial Department of Education has not handled with confidence the problems of technical education ". But they recommended that technical education should remain under the Director of Public Instruction, the immediate control resting with an enlarged Committee of Direction, over which the Director of Industries could, if necessary, preside. But a Committee appointed by the Provincial

Government in 1926 to examine the working of the reconstituted department of Industries found that the Director of Industries was not a member of the Committee of Direction. They recommended his addition to the Committee and advised that industrial education should be placed under his control.

In Madras, a committee on technical and industrial education which presented its report in 1923 approved the system in force by which trade and industrial schools were supervised by the Industries Department and the colleges and higher institutions by other departments. In the Punjab, prior to the report of the Industrial Commission, industrial and technical schools were few and were under the control of the Education Department. The Punjab Government accepted the advice of the Commission and the schools were transferred to the Industries Department. The position therefore is that technical and industrial schools are under the jurisdiction of the Department of Industries whereas Technical Colleges are under the universities and *ipso facto* under the Education Department.

In their report on Vocational Education in India Messrs. Wood and Abbott observed as follows :—

"139. There remains for discussion the important question of the control of the trade, industrial and technical schools, that is whether they should be transferred to the Department of Education when this assumes responsibility for a certain measure of vocational education; or whether their control should remain, as at present, with the Department of Industries. The latter course was recommended in 1918 by the Indian Industrial Commission, which had carefully considered the various factors to be taken into account in reaching a decision in this point (Section 178 and 179 of their Report); and their recommendation was accepted and acted upon.

"140. We are bound to point out that in nearly every great industrial country of whose system of vocational education we have any knowledge (and we have obtained information on this point from more than twenty different countries) technical education and general education are administered by the same Department of State, i.e., the Ministry of Education, although this Ministry has, usually, separate sections each dealing with a particular branch of education. Nevertheless, we are not disposed to recommend that at the moment any transfer of the trade, industrial and technical schools should be made from one department to another, though we believe that such a transfer may ultimately be necessary. Our reasons for this conclusion are—

(a) It is not desirable to modify an existing arrangement, which is generally understood and accepted, unless quite cogent reasons exist.

(b) The schools, as now organised, are often productive industrial undertakings rather than schools. Many of them buy raw materials, convert them into finished goods and sell the product; and their aim is, in many instances, to give manual skill rather than scientific knowledge.

(c) The Department of Education as yet have no staff competent to inspect and advise on technical education, whereas the Department of Industries in both provinces have officers of suitable experience and knowledge.

(d) The industrial schools are aiming, not merely at training students but at developing fresh industries and using new local materials.

"With the growth of preparatory vocational education and, as we hope, the development of technical schools of the polytechnic type in India, the conditions will be materially altered and the control of technical education may then have to be transferred, as in other industrial countries, to the Departments of Education. We believe, however, that at present the time is not ripe for this step to be taken"

"*Administration of Junior and Senior Vocational Schools.*—141. What we have said about the control of Industrial and Technical Schools does not apply either to Junior or Senior Vocational Schools, whose educational content is so very closely related to that of the Schools of general education. We recommend that they should in each province be administered by the Department of Education."

In November 1941, the Government of Assam pressed for the discussion by the Central Advisory Board of Education in India of the question of the co-ordination of the Departments of Education and Industries in regard to the promotion of Technical and Industrial education along with general education through universities and colleges. In doing so the Assam Government referred to the need for the development of technical education especially in relation to the process of industrialisation which had been stimulated by India's contribution to the War effort.

The Central Advisory Board of Education considered the question at their Seventh Meeting in January 1942, and, "while recognising the importance of the closest collaboration between the Department of Education and the other Departments of Government concerned with industry and commerce as well as industrial and commercial interests, were strongly of opinion that if overlapping and waste were to be avoided, all types of Technical Education, using the word in its broadest sense, should in all provinces be under the direct control of the Department of Education. They based this opinion mainly on the ground that whatever other interests may be concerned, both the primary objective and the technique required were essentially instructional. The Board regarded the matter as of particular importance in view of the industrial developments which may be anticipated after the war and of the contribution which Technical Institutions would be expected to make in this connection. Even in the case of War emergency measures like the Technical Training Scheme the Board would attach much importance to close consultation between the department immediately responsible for the scheme and the education authorities affected by it." At their Eighth Meeting held in January 1943 the Board reiterated the recommendation made at their Seventh Meeting that all types of Technical Education should be under the control of the Education Department concerned.

ANNEXURE IV.

DRAFT LETTER PROPOSED TO BE ISSUED BY THE PRESIDENT, ASSOCIATION OF PRINCIPALS OF TECHNICAL INSTITUTIONS (INDIA), TO THE DIRECTORS OF PUBLIC INSTRUCTION AND DIRECTORS OF INDUSTRIES OF ALL PROVINCIAL AND STATE GOVERNMENTS.

Association of Principals of Technical Institutions (India).

I enclose herewith a pamphlet describing the reasons for the creation of the Association of Principals of Technical Institutions (India)—its aims and objects, together with a copy of its Constitution. The appendix to the pamphlet gives an account of the activities, achievements and ambitions of the Association of Principals of Technical Institutions (England) and the Association of Principals of Technical Institutions (India). The Educational Adviser to the Government of India has given full support on behalf of the Government of India. This Association believes that your Government will recognise the need for co-ordinating Technical Education in India and will co-operate with it in such a manner as to make this possible.

1. by recognising the A. P. T. I. (India),

2. by accepting the All-India Diploma and Certificate Schemes (copy attached) prepared and recommended by the A. P. T. I. (India) by adopting the All-India Courses in the Technical Institutions within your juris-

diction and by accepting the financial commitments implied, namely :—a fee payable to the appropriate Joint Examination Board by each institution on applying for recognition and annually a fee per subject in which candidates are to be presented in a final examination.

3. by releasing, if required, any Principal in your employ to take part in the Proceedings of the Council of the A. P. T. I. (India), not more than four times a year, any in the Annual General Meeting of the A. P. T. I. (India) and to pay the expenses incurred by your Principal engaged in this connection.

4. by nominating a representative to the Consultative Committee which is being set up to draw up a Policy in Technical Education.

This Association will always be glad to receive suggestions from you for the betterment of Technical Education in this country with an indication to the extent to which you will be prepared to commit your Government.

A pamphlet describing the reasons for the creation of the Association of Principals of Technical Institutions (India)—its aims and objects.

" Education today might be considered to have three main objects. It trained individuals to get a living, to live a life, to mould a world—in other words, it was education for work, leisure and responsibility."

(Sir Josiah Stamp)

In the last decade, unemployment amongst the educated middle classes in India grew to alarming proportions. The causes for the malady and the remedies, therefore, came to be seriously discussed by Governments, Universities and leaders of public opinion. Enquiry Committees were set up and in several cases exhaustive reports were written and published.

In general, the existing system of education came in for severe criticism as one of the main causes for the extent of unemployment amongst University graduates and under-graduates. While the old system does not deserve the wholesale condemnation to which it is subjected, it will have to be agreed that it was too academic and too far divorced from first hand contact with the needs and conditions obtaining in industry. There is need for a greater variety of occupation. It was neither planned nor well defined.

Suggestions for educational reform covered a wide field, from the primary to the post-graduate standard. Industrialisation on a countrywide scale, came to be regarded by many as a sovereign remedy.

While all agreed that the situation was serious, the ways and means suggested to meet the situation were necessarily different.

With the introduction of the constitutional reforms in 1921, Indian education became a " Provincial " subject and was placed under the charge of a Minister responsible to the provincial legislature. The control and supervision exercised by the Government of India over education in the Provinces ceased.

Along with many advantages certain disadvantages came to be noticed as a result of this transfer, arising " mainly from an undue growth of provincial exclusiveness. The Government of India realising the possibilities of these dangers, still desired to take part in educational discussions and to assist provincial governments by the dissemination of valuable information and by arranging for meetings held with the object of promoting interchanges of thought and experience. "

This led to the establishment in 1921, of a Central Advisory Board of Education, which the Government of India, on the advice of the Indian Retrenchment Committee, decided to abolish in 1923, though they were doubtful of the wisdom of such a step.

The situation arising from the scale of unemployment amongst the educated middle classes must, in no small measure, have been responsible for the revival of the Board in Agust 1935.

At its inaugural meeting, the Board formulated proposals for a radical reconstruction of school education. The scheme contemplated the division of the school courses into definite stages, each with clearly defined objectives, which would enable pupils, on the completion of each stage, either to pass on with as little disturbance as possible to the next stage or enter employment.

On the advice of the Board, after consulting the Provinces and with their concurrence, the government of India in 1936, secured the services of Messrs. A. Abbott and S. H. Wood to advise the Provinces in the task of educational reconstruction, with special reference to technical and vocational instruction. The selection of these experts was made with the assistance of the Board of Education in the United Kingdom. Mr. Abbott was a former Chief Inspector of Technical Schools in England and Mr. S. H. Wood was Director of Intelligence at the Board of Education, England.

Messrs. Abbott and Wood visited India during the winter season of 1936-37. After an intensive study of conditions in the United Provinces, the Punjab and Delhi, which they considered more profitable than a necessarily cursory survey of British India generally, they submitted to the Government of India their report entitled "Vocational Education in India, with a section on General Education and Administration". But before the Provincial Governments had time to examine the report and take action to suit their requirements, the war broke out.

"War is waste but is not all waste". This is particularly applicable to Technical education which came into prominence through the unprecedented demand for additional skilled workers for the purposes of a highly mechanised war. The Technical Training Scheme, started in 1940, by the Labour Department of the Government of India for the intensive training of semi-skilled tradesmen for war purposes, aimed at turning out 50,000 men by the end of March 1943, with a total training capacity of about 28,000. The scheme applied not only to technical institutions but also to factories and workshops. These latter were further requested to co-operate in a process of "up grading" by which unskilled and semi-skilled replaced skilled and highly skilled labour for transfer to the technical branches of the Defence Services and Ordnance and Munitions factories.

At the end of July 1943, 37,116 candidates were being trained in 317 training centres all over India. The training centres are still not working to full capacity; there are vacancies for over 9,245 candidates. This scheme alone has more than doubled the existing facilities in the country, the number of students on the rolls of Technical, Craft and Industrial Schools in India being about 30,000 in the year 1937. 49,589 technicians have been supplied to the Indian Army, the Royal Indian Navy, the Indian Air Force, and Ordnance and Civil factories. In addition, men recruited directly by the Defence Services receive specialised training in the service workshops and with machines they handle.

The problem for post-war industry is not merely one of how to retain the additional workers taken on for expansion that was necessary to execute war contracts, but is also one of absorbing the skilled personnel no longer required for the Defence Services. Education of new personnel will be as important as re-educating and reconditioning the demobilised war technicians efficiently to serve the peace-time requirements of industry. The two aspects of the problem, industrial and educational, will have to be solved together.

It was recognised as early as 1935 that a radical reconstruction of school education was essential. The scheme formulated by the Central Advisory Board of Education at its inaugural meeting rightly laid great stress on the

intimate relationship between Secondary and Technical education. A stage appears to have now been reached when it is equally essential to carry the policy to its logical conclusion by a radical reconstruction of Technical education.

The substantial encouragement that the Governments have given to industry and to technical education as a part of their war effort can only be of permanent benefit to the country if those connected with technical education will, without any delay, formulate a policy for the co-ordination and co-operation of the different elements and work out a systematic plan for the future. This is all the more necessary if we are not to be confronted with a problem of unemployment similar to the one that stared us in the face in the middle and later years of the last decade.

Industrial self-sufficiency in terms of National Defence and serious interference of free importation of essential articles in times of war need hardly be stressed after the experience in the country during the last four years. New industries are springing up everywhere and old ones are moving forward under rapidly changing conditions. In order that this process may continue with ease and efficiency it seems desirable to evolve a system of technical education which can cope with the ever changing requirements of industry.

Any system of co-ordination and co-operation should have for its object the elimination of waste and duplication. It is well known that many provinces and Indian States have no engineering colleges of their own and the students from these areas experience great difficulties in securing admission into outside colleges. There are, on the other hand, many colleges offering instruction in Civil, Mechanical and Electrical Engineering but very few in Architecture, Marine Engineering, Aeronautical Engineering, Town Planning and other important subjects. The position is so serious that it is even difficult to secure comprehensive information about the details of the instruction imparted in different technical intitutions in the country, as prior to the formation of the Association of Principals of Technical Institutions (India), there was no organisation in existence which concerned itself with this all-important subject.

The existing conditions can hardly be deemed satisfactory. What is needed is a policy and a plan for co-ordination of effort. What should be the policy? Who are the persons best suited to lay down that policy? What should be the agency to put it into execution? These are questions which call for an urgent answer.

Before examining the details of the policy it would be necessary to understand the object it is intended to achieve. Technical education in its widest implication, covering education for Industry, Commerce and Citizenship must form an integral part of the educational system. The impression that this type of education is necessarily on a lower plane than literary education should be removed. For its success, it is essential that occupations should absorb the students who pass out of the technical schools. At the same time the purely educational benefit to be derived from studies of a practical kind must be recognised, and the expansion of technical education, not simply on the ground of its contribution to industrial development but also because it has a more stimulating effect on certain types of intelligence than a curriculum of the normal academic kind needs encouragement.

There are three parties principally concerned with technical education in this or any other country. They are the school, the college and the employer. They are engaged in producing young men who will be able to take their places in industry as artisans, foremen and executives. The artisan is the product of the primary school, the foreman of the junior technical school or technical high school and the executive of the Polytechnic, the technical college or the uni-

versity. The university, on the whole, tends to turn out a more academic article than the Polytechnic, with the result that the former leans towards research and the latter towards the managerial posts in industry. Universities take only a small proportion of a fairly uniform age, standard and type while the technical institutions are concerned with the remainder.

After a boy leaves the primary school the whole of industry should be open to him in accordance with his ability and his desire to apply it. If he completes the technical high school education, he should normally be able to go into industry where he can secure his further training in works, along with facilities to attend part-time classes at technical colleges to improve his theoretical knowledge. These part-time classes may be taken during the day by arrangement with the employer or in the evening in the students' own time.

If a man in Madras wants to employ a foreman who received the theoretical part of his training, after he started in the works or mill, at Delhi he should be able to see a certificate which would be as well known and have as much value to him as to a Delhi employer—in other words an all-India Certificate. The object is not to secure a common examination but to ensure a common standard.

If an employer, in Bombay, has before him candidates with diplomas or certificates awarded at Benares, Calcutta, or Madras, he should not have to weigh up the value of the respective qualifications. It would be a great help to him if he had a common standard by which to judge his prospective employees To secure this object by an all-India Certificate Scheme of Examination close collaboration between the college, the employer and the Governments is necessary. But before technical institutions can usefully and effectively participate in such a scheme they will have to be organised on a national basis.

Before a detailed policy for technical education can be adopted on an All-India basis, a survey will have to be undertaken to study the existing conditions so that changes and improvements can be devised to suit the changing requirements of an industrially young country. No opportunity should, however, be lost of deriving benefit from the experience of other countries who have led the way in industrialisation.

In 1937, four Associations in the United Kingdom, intimately connected with Technical Education, *viz.*, the Association of Technical Institutions, the Association of Principals of Technical Institutions, the Association of Teachers in Technical Institutions and the National Society of Art Masters appointed a Joint Committee to prepare a report on "Policy in Technical Education". The most valuable experience in the country would thus appear to have been brought to bear on the subject and the recommendations contained in the joint report would necessarily give a definite lead in the formation of a National policy. While some of the recommendations must, by their very nature, deal with problems that are peculiar to that country, there are others that are of a general nature and could with advantage be studied and applied to other countries as well.

The following ten out of twenty-two recommendations contained in the report could with equal force apply to Indian conditions:—

1. Technical Education should be organised on a regional basis. Where the region, regarded as an art, commercial, or industrial unit, embraces areas of more than one Local Education Authority, the arrangements should be such that students in any one institution, taking the same courses, may be treated alike in regard to fees and conditions of admission.

2. Co-operation between Technical Colleges, Art Colleges. Commercial Colleges, University Colleges, and Universities should be encouraged and so

defined as to secure co-ordination and to minimise overlapping in staffing and equipment.

3. Attendance at part-time day courses of study for advanced students should be encouraged.

4. Additional facilities should be provided to enable workers in small urban and rural areas who cannot obtain suitable Technical Education locally to proceed to centres for short intensive full-time courses of training. Similar courses might usefully be provided for workers from certain large centres either in their own towns or at chosen centres, where suitable groups could be collected.

5. A National Scheme of Technical and Art Scholarships should be provided to enable students of sufficient merit and works experience to pass into appropriate full-time day courses of study.

6. The system of National Diplomas and Certificates, forming a most valuable link between industry and commerce and education should be encouraged and, where possible, extended.

7. The teaching of Industrial Administration is capable of wide development, and should receive every assistance.

8. Short week-end or summer courses for specialist teachers organised by the Board of Education have proved most valuable and should be extended.

9. Courses of training in teaching should be made available as widely as possible for part-time teachers engaged in industry and commerce.

10. Facilities for physical training and social activities should be extended.

An all-India policy based on the principles enunciated in the above recommendations would be on a regional basis. It will depend on inter-provincial co-operation to minimise overlapping in staffing and equipment. Part-time day courses can be successful only if the employers adopt a progressive attitude towards employees and theoretical training. National Surveys and National Technical or Arts Scholarships can only be possible with liberal financial aid from industrialists and/or Governments. All-India Certificate, short week-end or Vacation courses and teaching of Industrial administration will require constant co-ordination between Governments, Technical Institutions, professional bodies and the employers.

For such a comprehensive policy, for its initiation and execution, consultations and exchange of opinions between Government representatives, employers, employees and teachers will be necessary. To suit the present Indian conditions it is felt that an Association of Principals of Technical Institutions would be a suitable body to help the smooth working of a National policy of Technical Education, while the formulation of such a policy will be the responsibility of a consultative body consisting of representatives of the Central Government, Provincial and State Governments, organised industries, Trade and Commerce, employers and employees. Provision can be made for the co-option of additional members on this Committee whose experience and advice is likely to be of value. Through a Standing Committee and various Sub-committees, the Consultative Committee could maintain permanent contact with the Association of Principals of Technical Institutions, which could suitably run the secretariat of the Consultative Committee.

The main responsibility to ensure the working of the policy would rest with the Association. For the working of any single item of the programme contained in the broad outline of a national policy suggested above, an organisation of this kind would appear essential. A Principal of a technical institution is the best person to advise on regionalisation, staff, equipment, National Certificates and scholarships, short week-end and vacation courses and the training of teachers.

An enthusiastic group of principals aided by a Consultative Committee as outlined above is best fitted to conduct a survey of the facilities at present existing in the Technical Institutions with a view to implementing a planned and well-defined policy.

With a national policy and a trusted, able and keen group of Principals of Technical Institutions guided and advised by a truly representative Consultative Committee, it should be possible to proceed confidently to make an effective contribution in the building up of a democratic post war industrially-minded India.

APPENDIX.

The A. P. T. I. (England) is a body which has taken firm root in that country and is one of the chief agencies for co-ordinating Technical Education on a National basis acting in an advisory capacity to the Board of Education. The Association deals with matters such as entrance examinations, the relationship between Secondary and Technical Education, Syllabuses, Examinations, Diplomas, Certificates, Scholarships, Staff, buildings, equipment, libraries, recreational and social amenities, research, etc., pertaining to Technical Education. It also co-operates with its sister associations (A. T. I., A. T. T. I. and N. S. A. M.) and professional bodies in regard to all matters of common interest, but it has no executive powers.

The more important matters which the A. P. T. I. (England), in conjunction with its sister associations, has so far achieved, are the following:—

(1) Most of the Principals of Technical Institutions are members of the A. P. T. I., and the work and progress made by the association are given publicity through periodic bulletins.

(2) (a) It has established links with technical educational organisations in other countries so that common Problems of Technical Education are discussed and their knowledge is kept up-to-date.

(b) It maintains contact with the English-Speaking Union and other similar organisations. These bodies award scholarships which enable the holders to visit and see industrial works of other countries.

(c) It is represented on the British Management Council, which provides facilities for education and training in industrial and commercial management.

(3) It has been able to establish uniform scales of salaries for the teachers of Technical Institutions, with extra allowances available for those teachers whose work is of an advanced character.

(4) It has formulated a scheme for the training of technical teachers.

(5) It has set up a system of State Technical Scholarships.

(6) It has helped to establish the National Diploma and Certificate schemes. The schemes themselves are based upon collaborattion between the Board of Education and the appropriate national professional organisation, on the one hand, and the local Technical Institution on the other. The National Diploma and Certificate schemes now cover Mechanical Engineering, Electrical Engineering, Naval Architecture, Chemistry, Building, Textiles, and to some extent Gas Engineering and Gass Supply ; other proposals are being considered, and a scheme for Board of Education Endorsed Certificates in Commerce has been put into operation.

Some light will be thrown on the present activity of the Association from the following account on the recent Memorandum entitled "Britain needs a National Policy of Technical Education" (*vide* Times Educational Supplement, 8th May 1943).

"The Memorandum outlines a comprehensive policy for Technical Education as the only sure foundation for national development. It further states that nothing less than a fully comprehensive national plan, covering the entire field of technical and commercial education will suffice to meet future needs. This plan must make provision for boys and girls, adults and juveniles, for all grades of ability and every kind of occupation ; it must be co-ordinated with all other aspects of education and incorporated with the total educational policy of the nation. It is with this conviction, states the Memorandum, that the Association of Technical Institutions and the Association of Principals of Technical Institutions are now engaged in considering proposals for a national policy of Technical Education".

In July 1941, Mr. W. W. Wood, F.R.I.B.A., M.I. Struct .E, Principal, Delhi Polytechnic, Delhi, called a meeting at Delhi of Principals of Technical Institutions from all over India. Mr. John Sargent, C I.E , M.A., Educational Adviser to the Government of India, presided at the first session. The meeting resolved to form an Association of Principals of Technical Institutions in India, on the lines of the A. P. T I. (England), for the express purpose of co-ordinating Technical Education throughout the country, including Indian States.

The A. P. T. I. (India) set up a Constitution Sub-Committee which drew up the Constitution. Pressure of work due to the fact that the members of the Association are connected with the Technical Training Scheme, also difficulties of travel, and shortage of funds, have been the main impediments in the functioning of the Association. However, within the short period of its existence, it has been able to achieve the following towards the co-ordination of Technical Education in India:—

1. It has a membership of 60 and the Association maintains contact with the Inter-University Board and the Central Advisory Board of Education.

2. It has prepared a programme and terms of reference for an All-India Consultative Committee to draw up a Policy in Technical Education in which all interests—Governmental, employers, employees, educational and examination will be represented (copy attached).

3. It has prepared a scheme for All-India Diploma Certificate Courses in Technical, Art and Commercial subjects (copy attached).

(a) It has formed a Joint Examination Board with Sir Cameron Badenoch, Auditor General in India as Chairman to implement the A. P. T. I. (I) Scheme in 'Commerce' and All-India Diploma Certificate courses in Commerce have now been established at Delhi Polytechnic.

(b) It is taking steps to form Joint Examination Boards in Engineering, Applied Science, Art, Architecture, etc.

(c) It has been invited by the Government of India, Department of Education, Health and Lands, to form a Joint Examination Board for the conduct of the Pre-Engineering Course of Delhi Univesity.

The Joint Examination Board will form a Sub-Committee to draft syllabii of courses, etc.

4. It hopes to institute a Sub-Committee on post-war training for ex-service men and others, with a view to equip them for peace-time occupations in industries.

THE ASSOCIATION OF PRINCIPALS OF TECHNICAL INSTITUTIONS (INDIA).

All-India Diploma and Certificate Scheme.

1. The All-India Diploma and Certificate Scheme will aim at producing:
   (a) Foremen and Charge hands, and
   (b) Supervisory grades, in industry and persons in equivalent positions in the professions and commerce.

2. It is proposed to run two types of courses:
   (a) All-India Certificate Course which will be a:
      (i) Part-time Day Course, or
      (ii) Part-time Evening Course, or
      (iii) Part-time Day and Evening Course.

   These courses are intended to provide Technical Training for persons already in employment.

   (b) All-India Diploma Course which will be a Full-Time Day Course.

3. All-India Certificate Course:
   (a) *Preliminary*:

   Object :—This is a preparatory course for the Senior All-India Certificate Course.

   Qualifications for admission :—

      (i) After completion of 6th or its equivalent class.
         Duration :—4 years.

      (ii) After completion of 9th or its equivalent class.
         Duration:—2 years.

   (b) *Senior* :

   Object :—To prepare persons already in the employ of workshops, factories, etc., for promotion as Foremen and Chargemen, and to equivalent positions in the professions and commerce.

   Qualifications for admission:

      (i) The Preliminary All-India Certificate;
      (ii) A Leaving Certificate of a Technical High School ;
      (iii) Up to the Matriculation standard conditional upon passing the prescribed admission examination. Admission to a year of a course higher than the First year may be made by the Principal on the recommendation of the Head of the Department concerned after a personal interview with the candidate.

      Duration :—3 years.

   (c) *Advanced*:

   Object :—This is in continuation of the Senior All-India Certificate Course for a higher qualification.

   Qualifications for admission : A senior All-India Certificate :

   Duration :—1 to 3 years according to subject.

   In all the above courses instruction must be provided for at least 180 hours per annum.

4. All-India Diploma Course :
   (a) *Senior:*

   Object :—To prepare persons for Supervisory Grades.

   Qualifications for admission :

      (i) A Leaving Certificate of a Technical High School ; or
      (ii) Up to Matriculation standard conditional upon passing the prescribed admission examination

   Admission to a year of a course higher than the First Year may be made by the Principal on the recommendation of the Head of the Department concerned, after a personal interview with the candidate.

   Duration :—Three years' full-time training plus one year's full-time practical training in a recognised industrial or commercial concern.

   (b) *Advanced:*

   Object :—This is in continuation of the Senior All-India Diploma Course for a higher qualification.

Qualification for admission:

A Senior All-India Diploma in the same subject.

Duration :—One year's full-time training plus one year's full-time practical training in a recognised industrial or commercial concern.

5. The A. P. T. I. (I), in conjunction with the individual institutions like the Institution of Engineers, India; Institute of Architects, India; Mill-owners, India, (Bombay, Ahmedabad, Calcutta); European and Indian Chambers of Commerce, Indian Branch of Institute of Chemistry, etc., will form the Examining and Certificate and Diploma awarding body and will be styled the "Examination Board". Subject to their acceptance of the Scheme the Certificate or Diploma will be endorsed by the Central and Provincial or Indian State Government concerned.

6. *Definition* : In the following rules the term Association refers to the "Association of Principals of Technical Institutions (India)" and the term "Board" as defined at (5) above, to the Examination Board.

7. Colleges or Schools seeking the approval of schemes must submit these in accordance with the instructions laid down by the A. P. T. I. (I). Before approving a scheme the Association and the Board will require to be satisfied, for the purpose of the courses under the scheme, as to the equipment of the school, the qualifications of the staff, the curriculum and syllabuses of instruction in the several subjects, and the steps to be taken to secure that students are not admitted to the courses unless they are qualified to profit by them

8. Examinations upon the courses of study as set out in syllabuses submitted with the schemes must be held in each year of the course. The examinations in all except the final stage in each course will be conducted by the Technical Institutions or Colleges concerned. The final examination in each stage of each course will be conducted by the Board.

9. It will be a condition of approval of a scheme that certificates and diplomas shall be issued only to those candidates who pass the prescribed examinations, and that no candidate shall be awarded any certificate or diploma by the Board on the result of a common examination in which he has failed to obtain an All-India Certificate or Diploma. The further conditions of issue, *viz.*, as to home work, class work, laboratory work, etc., prior to the final year of the course must be submitted for approval. The right is reserved to call for the worked papers and the testimonies of the studies of any student to whom the issue of a certificate or diploma is desired and for any school records of his attendance, etc. The award of a certificate or diploma may be withheld if the prescribed conditions are not satisfied.

10. Arrangements must be made by the College or School Authorities for the conduct and supervision of the examinations held under the scheme. The examinations will be open to inspection by representatives of the Board.

11. The marking by the examiners appointed by the Board of the papers worked in the final examination will be subject to revision by the Board and the marks as accepted or revised by them will be taken into account as explained below for the purpose of awarding certificates, diplomas or distinctions.

12. In order to obtain a certificate or diploma a candidate must make not less than 75 per cent. of the possible attendances in each year of the course, and must obtain :—

(i) not less than 40 per cent of the possible marks in each subject in the final examination ;

(ii) not less than 40 per cent. of the possible marks obtainable in the final year for home work, class work, laboratory work, etc., taken separately, in each subject for which such marks are to be awarded under the approved scheme ;

(iii) not less than 50 per cent. of the grand total of marks obtainable in the final year. Of this total the possible marks in the final examination should constitute 70 per cent. and the remaining 30 per cent. should be the possible marks for home work, class work, laboratory work, etc., for the final year.

In order to obtain an endorsement in a subject where no marks are available for home work, class work and laboratory work, etc., a candidate must secure not less than 50 per cent. of the possible marks in that subject.

13. A distinction may be awarded to any candidate qualified to receive a certificate or diploma who gains not less than 70 per cent. of the possible marks in the final examination in any subject and his cerficate or diploma may be specially endorsed with the name or names of the subject (s) in which he has thus distinguished himself.

Holders of Advanced Certificates or Diplomas may be candidates at subsequent examinations, with a view to obtaining distinction, but this will not be permitted in the case of Senior Certificates or Diplomas.

For a limited period after a scheme has been approved, certificates and diplomas may be awarded to students who have not fulfilled the prescribed conditions in earlier years, provided that the conditions applicable to the final year have been completely satisfied.

14. All syllabuses will be issued by the Board in skeleton form and the Technical Schools/Colleges will submit detailed syllabuses based thereon for the approval of the Board.

15. *Examination Fees:—*

All-India Certificate:

	Rs.
(a) Preliminary	5
(b) Senior	10
(c) Advanced	15

All-India Diploma:

	Rs.
(a) Senior	20
(b) Advanced	25

ASSOCIATION OF PRINCIPALS OF TECHNICAL INSTITUTIONS (INDIA).

Constitution.

1. *Title.*—The title of the Association shall be the "Association of Principals of Technical Institutions India".

2. *Object.*—To confer on all matters relating to the work now conducted and which may be conducted in the Technical Institutions, and to take such action with reference thereto as seems desirable.

3. (i) *Membership.*—Members of the Association shall be Ordinary Members, Life Members and Honorary Members. In the case of Ordinary Members, membership shall be limited to persons holding the position of whole-time principal of one of the following :

(a) Technological, Commercial, or Art Institution which provides a full time progressive course of instruction, covering at least 3 years, for students over the age of 16, leading to a degree, diploma or certificate, provided that the Institution in question is affiliated to a University or is maintained by or receives a grant from the Central Government, the Government of a Province or of an Indian State.

(b) High School offering full-time instruction of a technological or vocational character to all students for a period of not less than 3 years.

(c) Institution imparting progressive part-time instruction in technological, art or commercial subjects, leading up to qualifications under (a), provided the institution has had at least 100 individual students on its rolls in each of the 3 consecutive calendar years, prior to application for membership.

An officiating Principal, as well as a Principal, who is on furlough or absent from his post, may both be members of the Association.

Notwithstanding what has been laid down above, the Council reserves the right to accept or reject any application for membership, subject to the approval of a general meeting.

Life membership, admission to which shall be made at the annual general meeting on the nomination of the Council, shall be limited to persons who, having been Ordinary Members, have retired from active service with an institution as defined above.

Honorary Members shall be nominated by the Council or by the District branches for election at the annual general meeting. Honorary Members will be elected for a period of one year at a time.

3. (ii) *Associateship.*—Associates shall be persons having held the post of whole-time Principal of an institution mentioned in para. 3, sub-paras. (a), (b) and (c) temporarily, and who have reverted to their substantive post in the same institution.

4. *Voting.*—Members and Life Members shall each have one vote. Honorary Members shall have no vote but may attend all general meetings. The Chairman of Committee or meeting shall have a casting vote in addition to his own individual vote. Associates shall have no vote. An officiating Principal (or the person in active charge of the Institution) shall have a vote only whilst holding the office of Principal in the absence of the Principal. Should the Principal be temporarily in charge of another Institution as defined in (a), (b) or (c) under para. 3 (i) both have the right to vote.

5. *Subscription.*—The subscription of each Ordinary Member shall be Rs. 10 a year. The fee for Life Membership shall be the amount of one year's Ordinary Membership subscription, i.e., Rs. 10. Principals elected to Ordinary Membership on and after 1st July in each year shall be required to pay half the annual subscription for that year. An ordinary member may, if he so desires, pay a compounded subscription of Rs. 100 to cover the whole period of active Ordinary Membership.

Subscriptions shall be due in advance on the 1st January in each year. Fees for Life Membership shall accompany application for transference to this class. Members who have not paid their subscriptions by the beginning of December will receive notice of the same by registered letter from the Honorary Secretary in calling the Annual General Meeting, and such defaulting members will have no power to vote until their arrears of subscription have been paid.

6. *Officers of the Association.*—The Officers of the Association shall consist of:—

The President,
The Vice President (who shall be president-elect for the following year),
The Hon. Treasurer, and
The Hon. Secretary or two joint Hon. Secretaries.

Casual vacancies may be filled by the Council and remain valid until the next Annual General Meeting.

The Officers shall be proposed and seconded in writing not less than 60 days prior to the Annual General Meeting and elected by a majority by postal vote and the results announced by the Hon. Secretary at the Annual General meeting.

The Council may appoint an Assistant Secretary, who need not be a member of the Association, and they are empowered to grant an honorarium to such Assistant Secretary.

7. *Meetings of the Association.*—The official year of the Association shall be the calendar year.

(a) An Annual General Meeting shall be held on a date and at a place, to be decided by the Council.

The bussness shall be :—

(1) to receive the Annual Report of the Council,

(2) to receive the Financial Statement,

(3) to elect the Officers of the Association and the members of the Council,

(4) to elect Auditors,

(5) to transact any other business in accordance with Article (2) of the Constitution.

(b) A Special General Meeting shall be called by a resolution of the Council, or at the request of ten members, forwarded in writing to the Hon. Secretary. Fourteen days, notice of such a meeting shall be considered sufficient, and the meeting shall take place within twenty-eight days of the receipt of the request by the Hon. Secretary.

8. *District Branches.*—Members shall be grouped as belonging to one or other of the following districts, *viz.* :—

Northern, Southern, Eastern, Western and Central.

Each District Branch shall appoint a Chairman and a Convener and shall arrange meetings of its members at such times and places as may be found convenient. Each such Branch may form Sub-Branches, if desired. The rules for the government of Branches and Sub-Branches shall be framed by the Council and approved at a general meeting.

The Treasurer of the Association shall be empowered to meet the expenses incurred by a Branch in summoning meetings of the Branch or Sub-Branches and in issuing Minutes and other reports, provided that such expenses do not in any year exceed two Rupees per ordinary member of the District Branch.

No District Branch or Sub-Branch shall have power to enter into negotiations involving questions of policy with other bodies except through and with the consent of the Council.

9. *Council.*—There should be a Council, consisting of the officers of the Association, together with the retiring President and ten district representatives, two from each district.

No district representative on the Council shall normally continue in office for more than three years, or be eligible for re-election until after an interval of one year from the date of his retirement from office. The order of retirement shall be subject to the further limitation that a member elected to fill a casual vacancy on the Council shall hold office only until the expiry of the term of office of the member whose place he has taken. Such period of service on the Council shall not prevent a member from immediate election to a further period of three years.

The retiring President shall be a member of the Council for a period of one year.

Elections of district representatives to membership of the Council shall be made by the District Branches. The names of members so elected shall be forwarded to the Hon. Secretary twenty-one days prior to the Annual General Meeting.

10. *Meeting of the Council.*—Meeting shall take place as often as the Council may decide, and at such places as may be found most convenient. The quorum shall be four out of 16. The Council may be summoned by the President on receipt of a request in writing by three members of the Council, such meeting to be held within fourteen days of the receipt of request by the Hon. Secretary.

11. *Notices of Meetings.*—Notices calling ordinary, general and Council meetings, other than on the President's requisition, shall be despatched by the Honorary Secretary 30 days in advance of the meeting.

12. *Alterations to Rules.*—No alteration shall be made in these Rules except at the Annual General Meeting, and notice proposing any alterations must be in the hands of the Hon. Secretary one month before the date of the Annual General Meeting, and be circulated amongst the members at least one week before the date of the meeting. Such alterations shall require by show of hands, or such other method as the Chairman of the Meeting may decide, a two-thirds majority of members present at the meeting.

Association of Principals of Technical Institutions (India) Consultative Sub-Committee.

Meeting of the Consultative Sub-Committee held on Thursday, the 15th October 1942

The following resolutions were finally accepted for presentation to the Executive Committee, Association of Principals of Technical Institutions (India), for adoption:—

1. That a pamphlet describing the reasons for the creation of the A.P.T.I. (I) and its aims and objects, if possible, with a foreword by the Member for Education, Health and Lands or the Educational Commissioner, Central Government be issued. This pamphlet, with a copy of these proposals and a copy of the constitution, to be sent to the Secretaries of the Departments of Education, Health and Lands and of Labour of the Central Government, and Chief Secretraries to Provincial Governments and to the Governments of Indian States with an accompanying letter from the President explaining the desirability of creating a Consultative Committee to draw up a policy in Technical Education, pointing out that up to date only a Nucleus Committee has been formed, and inviting the Governments to nominate representives to serve on the Committee. Mr. B. R. Kagal very kindly undertook the preparation of the pamphlet.

2. It was felt that this country lacks a definite co-ordinated system of technical education. Our existing system of technical education is neither planned nor well defined.

3. It was felt that the facilities at present existing in the Technical Institutions in this country should be gone into in detail in order to overcome this defect. This survey can be undertaken by the Consultative Committee provided the governments and employers come forward with the necessary financial help. The survey should take into account the growth and development of technical education and report upon the provision of building accommodation, and the adequacy of equipment, staff, library facilities, sport facilities, etc., available in the institutions.

4. It was considered that technical education should be organised on an All-India basis. Education is at present a provincial subject, and owing to this arrangement there has been of recent years, a growing tendency to limit admissions to technical colleges and technical institutions to students domiciled in a particular province. This restriction of admission may ultimately lead to unnecessary duplication in certain branches of technology, and create more technical institutions without sufficient funds; and it will also tend to produce technically qualified men in excess of the demand. If Technical Education were organised on a basis of all-India co-operation, eliminating unhealthy competition without doing away with healthy rivalry, it would be possible to make arrangements for students to take courses of training in any institution, students from all over India being treated alike in regard to fees and conditions of admission.

5. It was considered desirable to encourage co-operation between Technical, Art, Crafts, and Commercial Institutions and Universities, so as to secure co-ordination and to minimise overlapping in staff and equipment.

6. It was considered necessary to increase the provision of full-time trade schools providing training in individual trades. In the provision of such courses due regard should be given to the possibility of absorption of students in industry and commerce.

7. The Sub-Committee felt that preliminary and secondary education should be reviewed in the light of the present conditions of India and consideration given to the creation of basic schools, Technical Bias Schools and Technical High Schools. Co-operation between all these and the Secondary and High Schools for general education should be encouraged.

8. The Sub-Committee was of the opinion that attendance should be encouraged at part-time Day Courses of study rather than, or in addition to, part-time evening course. Employers should be persuaded to release their employees for one or two days per week to attend day classes in addition to, or preferably instead of, evening classes, when students are tired out after a day's work.

9. The Sub-Committee considered that additional facilities should be provided to enable workers in small urban and rural areas, who cannot obtain suitable technical education locally, to proceed to centres for short intensive full-time courses of training. Similar courses might usefully be provided for workers from certain large centres, either in their own towns or at chosen centres, where suitable groups could be collected.

10. It was felt that schemes of Technical, Commercial and Art Scholarship should be provided to enable students of sufficient merit and works experience to pass into appropriate full-time day courses of study.

11. The Sub-Committee recommends that a system of All-India Diplomas and Certificates, forming a most valuable link between industry and commerce and education, should be created.

12. The grouped course-system, in which several closely related subjects connected with a particular trade are taught together as one single course, is recommended.

13. Short week-end or Summer Courses for specialist teachers were considered essential.

14. The Sub-Committee was of the opinion that every encouragement to undertake research should be given to teachers capable of carrying out original investigation, without detriment to the efficient performance of their normal duties. In all Technical Institutions doing advanced work, research by a fair proportion of the staff is essential to inspired instruction.

15. It was considered desirable to extend facilities for physical training and social activities.

16. The Sub-Committee understands that the Central Government has agreed to continue the War Technical Training Scheme for a minimum period of 18 months after the cessation of hostilities. The Committee thought it desirable that the Government should be advised on the form that this continued training of artisans should take. It was of opinion that, generally speaking, it should consist in a widening of practical training supplemented by the theoretical background that it has been impossible, owing to the time factor, to include in the original Scheme.


सत्यमेव जयते